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AUTHOR Lang, William Steve; Brackett, Elizabeth Jane
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ABSTRACT

A study measured the effectiveness of the computerized remedial reading program at Spartanburg Methodist College (South Carolina), and scrutinized potential instruments that might be used for placement and for exiting the program. Subjects were 48 college freshmen enrolled in a remedial reading class which consisted of 60% computer assisted instruction using the "Reading Efficiency System" (RES). RES comprehension and vocabulary tests were given to place students at appropriate instructional levels, and posttests to determine whether advancement to the next level was appropriate. The Nelson-Denny Reading Test was administered during the first week of class, at mid-term, and at the end of the semester (different forms) to monitor students' reading progress. Results showed the Nelson-Denny Reading Test to be inappropriate for this purpose, as its reliability correlations (which should have been high given testing-retesting of the same persons within relatively short periods of time) were low. RES comprehension and vocabulary pre- and posttests indicated significant improvements in students' reading skills. In general, students showed a grade-level gain of one or two years, thus indicating the effectiveness of the computerized reading class in teaching vocabulary and comprehension skills. (Five tables of data are included, and 17 references are attached.) (SR)

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Effects on Reading Achievement in Developmental Education: Computer Assisted Instruction and the College Student

William Steve Lang and Elizabeth Jane Brackett

Spartanburg Methodist College

Spartanburg, South Carolina

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EFFECTS ON READING ACHIEVEMENT IN DEVELOPMENTAL EDUCATION: COMPUTER ASSISTED INSTRUCTION AND THE COLLEGE STUDENT

INTRODUCTION

There is little question that tutorial (individual) instruction is the method of instruction that is most efficient in terms of student achievement and learning (Bloom, 1984). A more current question is the effectiveness of computers in delivering such individual tutoring and the measurable gains associated with Computer Assisted Instruction (CAI). In particular, can reading which necessitates advanced cognitive skills and abstract thought processes, be taught to students who are "behind" and needing the most efficient training in order to "catch up"?

One text, Computer Applications in Reading, describes a variety of attempts to teach reading with varying results (Mason, Blanchard & Daniel, 1983). In fact, it is not difficult to find quite a few computerized reading laboratories and clinics dedicated to remedial reading (Mason, 1982). Unfortunately, the instructor's knowledge of the ways to use software (Mason, 1983) and the type of software chosen (Ohanian, 1984) can squelch a student's desire to learn and inhibit the teaching of reading. Even step-by-step texts on the use of computers in teaching reading base their methods on pedalogical assumptions and do not actually collect data to determine the effectiveness of the program (Geoffrion & Geoffrion, 1983). On the other hand, researchers have found that justifying the method and measuring the effects of CAI is a greater problem than implementing the new strategy (Lang, 1984).

There are at least two problem areas in the assessment of program effectiveness (Payne, 1974). One concerns choosing the measuring device (perhaps a reading test) and assessing validity and reliability of that instrument. The other is data collection and the generation of meaningful statistics. Often a beginning knowledge of statistics is all that is necessary if the researcher adheres to a predetermined design and uses the available computer power that was also used to teach (Weinburg & Goldberg, 1979; Pinsky, 1983).

This report is an attempt to both measure the effectiveness of the computerized reading program at Spartanburg Methodist College and at the same time to scrutinize the potential instruments that might be used for placing and exiting the program. In this case, both jobs have been achieved with one study.

SUBJECTS

The sample consisted of 48 freshmen who were enrolled in English 110: Reaidng I at Spartanburg Methodist College. These students were initially placed in this class by their SAT scores and high school rank. During the first week of class, the Nelson-Denny Reading Test was administered to confirm each student's need for remedial reading. The demographic characteristics (see Table I) of the sample consisted of 28 (53.33%) males and 20 (41.67%) females. Of these 48 students, 26 (54.17%) were white; 20 (41.67%) were black; and 2 (4.17%) were Hispanic.

Insert table 1. about here

APPARATUS

A variety of materials was used in the English 110 course. Forty percent (40%) of the students final grades came from assignments and tests from the following materials:

1. Contemporary Vocabulary (Smith, 1979)
2. The Reading Connection (Iacone & Resnick, 1983)
3. SRA Reading Laboratory IVa (Parker, 1959)
4. EDL Controlled Reader (Rabb, 1974)

The Reading Efficiency System (RES) compromised sixty percent (60%) of the course requirements. The college's Independent Learning Center (ILC) served as the classroom for the reading students. This center is equipped with 20 Apple computers, monitors, disk drives, and four printers. The RES software consists of student, instructor, placement, and lesson diskettes.

PROCEDURES

Once the students were selected for the reading class, the RES placement test was given for both comprehension and vocabulary abilities. Subsequently, each student was placed at his own instructional level. Class and lab time was scheduled for students to progress through the vocabulary and compehension lessons. When a level was completed, a posttest was given to determine further instruction at that level or advancement to the next level.

In the RES, each pupil's "student diskette" keeps a record of lesson and test scores and tells the student which lesson to complete next. The "instructor diskette" allows the instructor to get a printout of each student's grades at any time. The instructor can also move a student to

any level of instruction if the initial placement seems inaccurate. Most students were able to complete three levels of comprehension and/or vocabulary lessons and tests in one semester. In addition to the computerized reading program, in-class and out-of-class assignments were completed by the students.

The Nelson-Denny Reading Test was given at mid-term and again at the end of the semester (different forms) to monitor the student's reading progress. A total reading grade level of 10.0 was arbitrarily set as a goal before the student could leave the remedial reading program. Each student's advisor was informed of these test scores in order to determine the need of further reading instruction for the next term.

RESULTS

These results are in two parts with the testing procedures and the reliability and validity of the measures being first and the achievement gains of the students being second.

The Nelson-Denny Reading Test is widely used but many currently available tests have been under fire for poor construction or misuse. The easiest way to determine a test's effectiveness only requires the simple correlation cofficient statistic(s).

When the same test (or a form of the test) is given to the same person within relatively short periods of time (usually a few weeks), there should exist a high, positive correlation between the scores in the absence of intervention. Typical Test-retest reliability on a well constructed test would produce correlations greater than .80. The reliabilit correlations produced by testing a sample during three intervals with the Nelson-Denny were much lower than this (see Table 2).

This indicates that on an individual basis the test has too much variability and may not reflect the accurate skill level of a particular student. As a placement and exit test, the Nelson-Denny proved to be inappropriate for our uses.

Insert table 2. about here.

Another correlational measure that indicates the concurrent validity of a test is the correlation of two measures that supposedly indicate the same thing. In this case, vocabulary and reading scores were obtained from both the computer testing and the Nelson-Denny (see Table 3). Concurrent validity is usually considered reasonable when correlation coefficients above .50 are produced. Again, our testing shows that the two measures are not testing exactly the same construct even though they both claim to measure vocabulary and comprehension. Which one is the most valid measure of those reading skills is unknown, but, some inferences can be made. Since the Nelson-Denny is approximately fifty years old (with revisions) while the computer testing was obviously developed in the last few years, the two vocabulary tests do not have the same word lists used for their construction. There is no clear indication as to why the comprehension tests, both of which have reading passages and questions to answer, are not related more closely.

Insert table 3. about here.

Another measure of the effectiveness of a test is construct validity. This is a measure of the tests ability to predict an observed behavior related to the test score. In this case, we alsohad the grades of the students. Naturally, a student whose course effort was good or poor should correlate respectively with the test results. Also, the achievement level on the RES system should correlate with the grades the students received. The correlations indicate a moderate, positive relationship between the Nelson-Denny post-test, the RES achievement level and the actual grade received in the class (see Table 4).

Insert table 4. about here.

The above discussions do not mean that the class mean (average) is not useful. The Nelson-Denny scores for the entire group showed slow, steady improvement and this is probably an accurate finding. A paired, one-tailed t-test of the Nelson-Denny pretest total scores to the Nelson-Denny post-test total scores produced a t of 1.83 which is a statistically significant improve ($p<.05$). The RES pretest for vocabulary was 7.5 while the average ending achievement was 8.3. This indicated a significant improvement ($t=8.7$, $p<.0005$). Likewise, the RES pretest comprehension score was 7.6 while the ending achievement was 9.8. This was also a significant improvement ($t=14.5$, $p<.005$). These results are summarized in Table 5.

Insert table 5. about here.

DISCUSSION

Despite the less than ideal realibility and validity figures, the consistent gain of one or two years grade equivalent on both the Nelson-Denny and the RES lead to the conclusion that the computerized reading class is effective in teaching vocabulary and comprehension reading skills. The positive correlations with the instructor's grades were a particularly strong indication of the validity of the project.

The poor test-retest reliability of the Nelson-Denny and its poor concurrent validity with the RES indicates that a better screening test might be found. A serendipitious finding is that the Nelson-Denny does not have a penalty for guessing. One student scored a surprisingly high posttest and an investigation led to the finding that he had guessed and answered all the items. As a sidelight, eleven (11) tests were scored after asking students to simply mark the answers at random. Almost all of the obtained scores would have exceeded our exit criteria!

Another problem occurred when three diskettes were purposely damaged by a student. If the instructor has not saved the student's progress on a regular basis, the computer work and current grade level for the students can be lost. When working with CAI, losing a diskette is like losing a class gradebook or set of tests. Be careful and make backup copies of diskettes.

As a result of the success of the RES training, more reading and literature software will be incorporated in succeeding terms. Also, an attitude and computer literacy survey for students using the computers was analyzed. The instructor's observation was that students using

the computers spend more "time on task" and the students report that they prefer the class to traditional lecture instruction. Numerical evidence of these observations from the survey indicated that the class had a relatively positive attitude about computers in the beginning and their attitudes changed very little over the course of the class.

Later adjustment of a student's placement level within the RES may be needed since computer "anxiety" or "illiteracy" can invalidate the initial placement results. Lesson scores between 90 and 100 indicate improper placement.

Table 1

Demographic Characteristics of the Sample

Characteristics		n	%
Sex	Male	28	58.33
	Female	20	41.67
Race	White	26	54.17
	Black	20	41.67
	Hispanic	2	4.17
Total		48	100.0

Table 2

Test-Retest Reliability Coefficients

Relation	Subtest	Coefficient
First Testing-Second Testing		
	Vocabulary	.74
	Comprehension	.52
	Total Test	.56
Second Testing-Third Testing		
	Vocabulary	.51
	Comprehension	.31
	Total Test	.41
First Testing-Third Testing		
	Vocabulary	.40
	Comprehension	.28

Table 3

Correlation Between Nelson-Denny and RES Placement Test

Measure	Correlation
Vocabulary	
Nelson-Denny	
RES	.42
Comprehension	
Nelson-Denny	
RES	.40

Table 4

Correlations of Final Grades with Nelson-Denny Test Scores and RES Achievement Levels

Achievement Measure	r
Nelson-Denny Prestest	
Total	.48
Nelson-Denny Posttest	
Total	.55
Vocabulary	.53
Comprehension	.47
RES Achievement	
Vocabulary	.54
Comprehension	.60

Table 5

Paired t-tests for Differences Between the Means of Nelson-Denny and RES Achievement Measures

Measures Compared	t	p
RES		
Pretest Vocabulary Achievement Level	8.74	> .01
Pretest Comprehension Achievement Level	14.55	> .01
Nelson-Denny		
Pretest Total Posttest Total	1.84	> .05

n=49

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